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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/821,570	03/29/2001	Thomas C. Mesing	13DV14029	3495
29399	7590	12/10/2003	EXAMINER	
JOHN S. BEULICK C/O ARMSTRONG TEASDALE LLP ONE METROPOLITAN SQUARE SUITE 2600 ST. LOUIS, MO 63102-2740			COMPTON, ERIC B	
			ART UNIT	PAPER NUMBER
			3726	
			DATE MAILED: 12/10/2003	

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Applicati n No.

09/821,570

Applicant(s)

MESING ET AL

Examiner

Eric B. Compton

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 18 November 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 11, 13-15 and 17-20 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 11, 13-15 and 17-20 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
* See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on November 18, 2003, has been entered.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over US Patent 3,781,205 to Cairns et al in view of WO 98/58986 to McDonald et al (T&N Technology Ltd).

Cairns et al disclose a method for manufacturing a bearing element comprising the steps of: forming a plurality of layers (see col. 3, lines 21-23), wherein the first layer is formed from a plurality of materials (a combination of two or more different materials fibers, see col³ 2. lines 26-29), and the second layer (a single layer of fiber, see col. 2,

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lines 21-22) is formed against the first layer and is formed from a single material, wherein the fibers include may carbon or graphite fibers, (see col. 2, lines 23-35), the layers may be braided or woven (see col. 3, lines 24-25);

forming a bearing element form the plurality of layers; and

impregnating the bearing element with a resin comprising fine particles of a solid lubricant (see col. 4, lines 30-35). The resin may be polyimide (see col. 4. lines 18-20). Furthermore, the fine particles may include PTFE (see col. 4, lines 41-44).

Cairns et al specifically, note "The low friction characteristics of such a structure are enhanced by utilizing particulate PTFE, with or without one or more particulate filler material, as solid lubricants." (col. 4, lines 58-61).

However, Cairns et al do not disclose plasma etching the bearing layers prior to bonding (i.e., impregnating step).

McDonald et al disclose a method of manufacturing a bearing element comprising: a layer of PTFE and a matrix material, including polyimide (see page 6, line 7). "Where adhesives are used, the bearing materials may require a pre-treatment such as chemical etching, **plasma pre-treatment**, irradiation, or the use of chemical coupling agents or adhesion promoters for example prior to the application of adhesive." Page 9, lines 13-17 (emphasis added).

Regarding claim 11, it would have been obvious for one of ordinary skill in the art at the time of invention, to have formed the bearing of Cairns et al by plasma-etching the bearing layers prior to bonding, in light of the teachings of McDonald et al, in order to improve bonding of the PTFE.

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4. Claims 11, 13-15, 17, 19, and 20, are rejected under 35 U.S.C. 103(a) as being unpatentable over GB 2,095,170 to Stanley et al in view of US Patent 3,781,205 to Cairns et al and WO 98/58986 to McDonald et al (T&N Technology Ltd).

Stanley et al disclose a method for manufacturing a bearing element comprising the steps of: forming a plurality of layers (12,14), wherein the first layer (glass fibers with Teflon, 12) and a second layer (glass fibers, 14); forming a bearing element from the plurality of layers, wherein the layers are woven (see col. 1, lines 54-55); and impregnating the bearing element with a polyimide.

However, Stanley et al do not disclose that the polyimide resin comprises PTFE particles.

Cairns et al disclose the invention above, specifically forming a multi-layered composite bearing impregnated with a polyimide resin having PTFE particles. Cairns et al specifically, note "The low friction characteristics of such a structure are enhanced by utilizing particulate PTFE, with or without one or more particulate filler material, as solid lubricants." (col. 4, lines 58-61), the layers may be braided or woven (see col. 3, lines 24-25).

It would have been obvious for one of ordinary skill in the art at the time of invention, to have formed the bearing of Stanley et al using a polyimide resin comprising PTFE particles, in light of the teachings of Cairns et al, in order to provide an enhanced bearing structure.

However, Stanley et al/Cairns et al do not disclose plasma etching the bearing layers prior to bonding (i.e., impregnating step).

McDonald et al disclose a method of manufacturing a bearing element comprising: a layer of PTFE and a matrix material, including polyimide (see page 6, line 7). "Where adhesives are used, the bearing materials may require a pre-treatment such as chemical etching, **plasma pre-treatment**, irradiation, or the use of chemical coupling agents or adhesion promoters for example prior to the application of adhesive." Page 9, lines 13-17 (emphasis added).

Regarding claim 11, it would have been obvious for one of ordinary skill in the art at the time of invention, to have formed the bearing of Stanley et al/Cairns et al by plasma-etching the bearing layers prior to bonding, in light of the teachings of McDonald et al, in order to improve bonding of the PTFE.

Regarding claim 13, Stanley et al disclose that the first and thirds layers (12) comprises the first material (glass fibers with Teflon fibers), and the second layer (14) comprises the second material (glass fibers). Cairns et al disclose two or more materials may be used.

Regarding claim 14, Stanley et al disclose that the layers are woven fabric (col 1, lines 120-125). Cairns et al disclose that the layers are may be braided or woven (col. 3, lines 24-25).

Regarding claim 15, Stanley et al disclose that weaves are known in the art (col 2, lines 75-84) and that various interweaving can be utilized for various strength characteristics. Therefore, a skill artisan would have found it obvious to use a braided layer, since braids are a well-known weave design. Cairns et al disclose that the layers are may be braided or woven (col. 3, lines 24-25).

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Regarding claim 17, Stanley et al disclose that layers may impregnated or bonded together with an epoxy.

Regarding claim 19, quartz is essentially naturally occurring glass fiber. Therefore, a skilled artisan would have found it obvious to use either, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 125 USPQ 416.

Regarding claim 20, Official Notice is taken that silane is a well-known coupling agent. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have used a silane coupling agent, in light of the Official Notice taken, in order to secure the bearing to a support.

5. Claims 11, 13-15, 17, 19, and 20, are rejected under 35 U.S.C. 103(a) as being unpatentable over GB 2,095,170 to Stanley et al in view of US Patent 4,111,499 to McCloskey and WO 98/58986 to McDonald et al (T&N Technology Ltd).

Stanley et al disclose a method for manufacturing a bearing element comprising the steps of: forming a plurality of layers (12,14), wherein the first layer (glass fibers with Teflon, 12) and a second layer (glass fibers, 14); forming a bearing element form the plurality of layers, the layers may be woven (see col. 1, lines 54-55); and impregnating the bearing element with a polyimide.

However, Stanley et al do not disclose that the polyimide resin comprises PTFE particles.

McCloskey discloses a method for manufacturing a bearing comprising fibers (4) impregnated with polyimide resin matrix having a random dispersion of polytetrafluoroethylene (Teflon) particles (see Figure 3). McCloskey discloses that the bearing material "includes a dry self-lubricating material for providing a low sliding friction surface, and which is wear resistant under heavy and constant loads and in further capable if operating in a hostile environment ..." (col 1, lines 45-50).

It would have been obvious for one of ordinary skill in the art at the time of invention, to have formed the bearing of Stanley et al using a polyimide resin comprising PTFE particles, in light of the teachings of McCloskey, in order to provide a better friction surface in hostile environments.

McCloskey discloses chemical etching prior to impregnating the layers in order to improve the bonding quality. See Col. 5, lines 28-46. However, Stanley et al/McCloskey do not disclose plasma etching the bearing layers prior to bonding (i.e., impregnating step).

McDonald et al disclose a method of manufacturing a bearing element comprising: a layer of PTFE and a matrix material, including polyimide (see page 6, line 7). "Where adhesives are used, the bearing materials may require a pre-treatment such as chemical etching, **plasma pre-treatment**, irradiation, or the use of chemical coupling agents or adhesion promoters for example prior to the application of adhesive." Page 9, lines 13-17 (emphasis added).

Regarding claim 11, it would have been obvious for one of ordinary skill in the art at the time of invention, to have formed the bearing of Stanley et al/McCloskey et al by

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plasma-etching the bearing layers prior to bonding, in light of the teachings of McDonald et al, in order to improve bonding of the PTFE.

Regarding claim 13, Stanley et al disclose that the first and thirds layers (12) comprises the first material (glass fibers with Teflon fibers), and the second layer (14) comprises the second material (glass fibers).

Regarding claim 14, Stanley et al disclose that the layers are woven fabric (col 1, lines 120-125).

Regarding claim 15, Stanley et al disclose that weaves are known in the art (col 2, lines 75-84) and that various interweaving can be utilized for various strength characteristics. Therefore, a skill artisan would have found it obvious to use a braided layer, since braids are a well-known weave design.

Regarding claim 17, Stanley et al disclose that layers may impregnated or bonded together with an epoxy.

Regarding claim 19, quartz is essentially naturally occurring glass fiber. Therefore, a skilled artisan would have found it obvious to use either, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 125 USPQ 416.

Regarding claim 20, Official Notice is taken that silane is a well known coupling agent. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have used a silane coupling agent, in light of the Official Notice taken, in order to secure the bearing to a support.

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6. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Stanley et al/Cairns et al/McDonald et al as applied to claim 17 above, and further in view of US Patent 3,873,168 to Viola et al.

Stanley et al/Cairns et al/McDonald et al disclose the invention cited above.

However, they do not disclose the substituting carbon fibers for glass fibers.

Viola discloses a bearing formed almost identical to that of the Stanley et al comprising: forming a plurality of layers (12,14) from a combination of a first material (graphite fibers, 12) and a second material (glass fibers, 14); forming a bearing element from the plurality of layers, the layers may be woven (see col. 2, lines 55-65); and impregnating the bearing element with a polyimide resin.

Regarding claim 18, it would have been obvious for one of ordinary skill in the art at the time of invention, to have formed the bearing of Stanley et al/Cairns et al/McDonald et al using carbon fibers, in light of the teachings of Viola et al, in order to provide a more wear resistant bearing (col. 3, line 40).

7. Claim 18 is rejected under 35 U.S.C. 103(a) as being unpatentable over Stanley et al/McCloskey/McDonald et al as applied to claim 17 above, and further in view of US Patent 3,873,168 to Viola et al.

Stanley et al/McCloskey/McDonald et al disclose the invention cited above.

However, they do not disclose the substituting carbon fibers for glass fibers.

Viola discloses a bearing formed almost identical to that of the Stanley et al comprising: forming a plurality of layers (12,14) from a combination of a first material (graphite fibers, 12) and a second material (glass fibers, 14); forming a bearing element

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form the plurality of layers, the layers may be woven (see col. 2, lines 55-65); and impregnating the bearing element with a polyimide resin.

Regarding claim 18, it would have been obvious for one of ordinary skill in the art at the time of invention, to have formed the bearing of Stanley et al/McCloskey/McDonald et al using carbon fibers, in light of the teachings of Viola et al, in order to provide a more wear resistant bearing (col. 3, line 40).

Response to Arguments

8. Applicant's arguments filed October 14, 2003, have been fully considered but they are not persuasive.

Applicant amendment has previously been considered, in that the references disclosed that the layers are woven or braided.

In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, the Examiner has made a prima facie showing that providing PTFE particles to polyimide resin to form a bearing element is suggests in the art to provide a better friction surface in hostile environments. Furthermore, the Examiner made a prima facie showing that plasma

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etching the bearing layers prior to bonding (i.e., impregnating step) to improve bonding adhesion of the PTFE.

In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). Thus, the fact that McDonald may disclose another type of bearing structure does not detract from its teaching, that plasma discharge improves adhesive bonding. See also the art cited below discussing that plasma discharge is known in the art for improving bonding.

Therefore, the rejections above are valid.

Prior Art References

The prior art references listed on the enclosed PTO-892, but not used in a rejection of the claims, are cited for their teachings of forming plain bearings.

U.S. Pat. 3,829,324 to Blais et al discloses treating a substrate with electrical discharge including plasma and corona discharge to treat a substrate to improve bonding. See Col. 2, lines 30-33.

U.S. Pat. 3,865,665 to Marion discloses a method of producing multi-layer flat film. A pretreatment, comprising corona discharge (i.e., plasma discharge) is preformed to render "the substrate more receptive to bonding." See Cols. 7-8, lines 59-10.

JP 07-238270 (ASHAHI GLASS CO) discloses treating a fluoro-resin with corona discharge to improve bonding.

WO 98/58986 to McDonald et al discloses pretreatment including plasma etching to improve adhesive properties on laminate plain bearing materials. See Page 9, lines 13-17.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Eric B. Compton whose telephone number is (703) 305-0240. The examiner can normally be reached on M-F, 9-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Peter B. Vo can be reached on (703) 308-1789. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9302.

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Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-1148.



Eric Compton
Patent Examiner
A/U 3726



DAVID P. BRYANT
PRIMARY EXAMINER